

Endocrine Disruptors and Wastewater Treatment: A Research Partnership by ORD, Region 5, and the Chicago Water Reclamation District

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The publication of reports on the occurrence of endocrine-disrupting chemicals (EDCs) in surface water and sediments are increasing rapidly. For example, a recent publication by the USGS showed that reproductive hormones and estrogenic alkylphenols were present in 40% and 70%, respectively, of the surveyed U.S. surface waters. While there are many possible sources of EDCs to surface water, many believe that municipal wastewater treatment plants are the major contributors of EDCs. Treatment plants receive wastewater from industrial, commercial, and residential sources that may contain EDCs and chemicals that break down into EDCs during treatment. For example, plants receive inputs of EDCs, such as reproductive steroid hormones, and receive inputs of alkylphenol ethoxylate surfactants that are metabolized during treatment into EDCs. A multi-organization team including ORD-NRMRL, ORD-NERL, Region 5, and the Metropolitan Water Reclamation District of Greater Chicago (District) is addressing the questions of why wastewater treatment plants emit EDCs and what strategies can be developed to minimize these emissions. Each organization in the team brings unique skills to the research: NRMRL provides expertise in wastewater treatment process analysis, NERL contributes state-of-the-art bioassays to help determine the performance of treatment, Region 5 brings real-world experience in risk management of wastewater treatment and expertise in analyzing wastewater treatment streams for EDCs, and the District is providing real-world experience with wastewater treatment plant operation, access to treatment plants, and sampling. All team members contribute to study design and interpretation of results. Studies are underway or planned to relate the estrogenicity of plant effluents measured using an EDC bioassay to plant design and operational parameters, investigate the removal of EDCs during wastewater treatment and sludge digestion, determine the biodegradation rates of EDC in sediments impacted by treatment plant effluent, and understand the fate of EDCs when biosolids are applied to land. This poster will describe the team, its collaborative approach to investigating wastewater treatment as sources of EDCs, and the research program the team has built.